

## DEPLOYABLE FOOT PLATFORM PERSONAL TRANSPORTATION DEVICE

### CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims the benefit of provisional application No. 62/373,967, filed Aug. 11, 2016, for a Ergonomic, Central-Wheel Structure Self-Balancing Device by the inventor herein.

### FIELD OF THE INVENTION

[0002] The present invention relates to personal transportation devices and, more specifically, to deployable foot platforms in such devices. The present invention also relates to compact light-weight design, equalized air pressure, enhanced stability, and other features in such devices.

### BACKGROUND OF THE INVENTION

[0003] The prior art includes self-balancing personal transportation devices. One is the Segway, described in U.S. Pat. No. 6,302,230 for Personal Mobility Vehicles and Methods, issued to Kamen et al., and another is the Solo-wheel, described in U.S. Pat. No. 8,807,250 for a Powered Single-Wheeled Self-Balancing Vehicle for Standing Use (the '250 patent), issued to Shane Chen, the inventor herein. The '250 patent is hereby incorporated by reference as though disclosed in its entirety herein.

[0004] While devices such as those disclosed in the '250 patent are an advancement in the art of transportation devices, they may have disadvantages aspects. One is that they are relatively bulky and heavy, making them somewhat unattractive and difficult to carry or stow, for example, if used in commuting where a person must carrying or stow the device when not in use, i.e., on a bus or train, or in the office. Thus, a need exists for a lighter-weight and/or better form factor device.

[0005] Furthermore, larger devices may be more intimidating to a new user, effectively creating a bar to use. A need exists for a lower profile device that is easier to step on or off of and that has a sleeker, less intimidating appearance. A more stable device is also sought.

[0006] A need also exists for ready retraction and deployment of foot platforms, including retraction and deployment that occur automatically or near automatically when a user picks up or sets down the device.

[0007] In addition, for embodiments having two paired wheels or a single tire structure with two tires, a need exists for pressure equalization between the tires. This would improve shock absorption, steering, turn efficiency, and stability.

### SUMMARY OF THE INVENTION

[0008] Accordingly, it is an object of the present invention to provide a personal transportation device that overcomes the shortcomings of the prior art and meets the unmet needs.

[0009] It is also an object of the present invention to provide a personal transportation device with ready deployment and retraction of the foot platforms, either through a linkage mechanism or another mechanism.

[0010] It is another object of the present invention to provide a personal transportation device that has a "user-friendly" appearance and configuration so that it appears

inviting and non-intimidating and is in fact easy to use, particularly for first-time and newer riders.

[0011] It is yet another object of the present invention to provide a personal transportation device that has a dual tire structure with air pressure equalization.

[0012] These and related objects of the present invention are achieved by use of personal transportation device as described herein.

[0013] The attainment of the foregoing and related advantages and features of the invention should be more readily apparent to those skilled in the art, after review of the following more detailed description of the invention taken together with the drawings.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIGS. 1-6 illustrate one embodiment of a self-balancing personal transportation device in accordance with the present invention.

[0015] FIGS. 7-12 illustrate another embodiment of a self-balancing personal transportation device in accordance with the present invention.

[0016] FIG. 13 is an elevation view illustrating a wider tire.

[0017] FIG. 14 is an elevation view illustrating the potential height of folded platform sections relative to tires.

[0018] FIGS. 15-16 are perspective views of yet another embodiment of a self-balancing personal transportation device in accordance with the present invention.

[0019] FIG. 17 illustrates the device of FIG. 15-16 yet with a wider tire.

### DETAILED DESCRIPTION

[0020] Referring to FIGS. 1-6, one embodiment of a self-balancing personal transportation device 10 in accordance with the present invention is shown. Device 10 operates similar to the self-balancing device(s) of the '250 patent referenced above, particularly with respect to propulsion, speed and direction of travel.

[0021] Device 10 may include two tires 42,43 mounted on a rim 41 (FIG. 2). This may be referred to as a "single wheel structure." In the embodiments of FIGS. 13 and 17 below, a single tire may be provided on a rim, and this may also be referred to as a "single wheel structure." The term "single wheel structure" as used herein refers to one or more tires mounted to a single rim, or to multiple rims that are coupled together so as to move at the same speed and direction.

[0022] As shown in phantom lines in FIG. 3, a gyroscopic position sensor 52, electronic control circuit 57 and a hub motor 55 are preferably provided. The position sensor may sense fore-aft position and the control circuit preferably drives hub motor 55 (which in turn drives rim 41) towards fore-aft balancing of the device based on the sensed fore-aft position. Sensor 52 may also sense side-to-side (or lateral) tilt. Control circuit 57 may adjust speed or other parameters based on a sensed sideways tilt, for example, slowing the device during a turn. Electronic control for a self-balancing single wheel structure vehicle is known in the art.

[0023] Device 10 may have two foot platforms 20,30. These are preferably mounted to a frame or housing 12 in such a manner that they may be moved between a deployed or in-use position and a folded or stowed position. In FIGS. 1-5, they are shown in the in-use or deployed position and, in FIG. 6, they are shown in the stowed position.